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EXAMINER

MEHTA, MEGHA S

ART UNIT

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Status Identifiers

1. Please note that the status identifier for claim 17 should be (Currently Amended).

Claim Objections

2. Claim 1 is objected to because of the following informalities: the claim recites “the structured structured metal layer” in line 4. Appropriate correction is required.
3. Claim 26 is objected to because of the following informalities: the claim recites “0.5 to 100 microns such, such that it extends...” in line 15. Appropriate correction is required.

Double Patenting

4. Applicant is advised that should claim 26 be found allowable, claim 25 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 24-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. Claim 24 recites the limitations "a structured metal layer," "the structured metal layer," "at least one metal foil," "at least one metal layer," "the metal layer," "the metal layer," "the

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metal layer,” “a structured metal layer,” “the structured metal layer,” “the structured metal layer” “the structured metal layer,” “the structured metal layer” and “the structured metal layer” in lines 2, 3, 5, 7, 8, 9, 10, 11, 14, 15, 16, 17 and 19. There is insufficient antecedent basis for these limitations in the claim. The Examiner appreciates that these are all referring to the same metal layer on the ceramic substrate. However, the metal layer must be referred to by only one phrase or it becomes unclear if there is another, separate layer involved.

8. Claim 26 recites the limitations "a structured metal layer," “the structured metal layer,” “at least one metal foil,” “at least one metal layer,” “the metal layer,” “the metal layer,” “the metal layer,” “a structured metal layer,” “the structured metal layer,” “the structured copper layer” “the structured metal layer,” “the structured metal layer” and “the structured metal layer” in lines 2, 3, 5, 7, 8, 9, 10, 11, 14, 17, 18, 19 and 21. There is insufficient antecedent basis for these limitations in the claim. The Examiner appreciates that these are all referring to the same metal layer on the ceramic substrate. However, the metal layer must be referred to by only one phrase or it becomes unclear if there is another, separate layer involved.

9. Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim lists step (g), but depends from a claim listing steps (a) -- (e). There is no step (f). Appropriate correction is required.

10. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 26 recites the limitations "a brazing resist coating,” “the at least one brazing resist coating,” “the brazing resist,” “the brazing resist coating,” and “the brazing resist coating”

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in lines 3, 13-14, 17, 19 and 21, respectively. The Examiner appreciates that these are all referring to the same brazing resist coating. However, the copper layer must be referred to by only one phrase or it becomes unclear if there is another, separate layer involved.

11. Claim 26 recites the limitation "the structured copper layer" in line 17. There is insufficient antecedent basis for this limitation in the claim.

12. Claims 27 and 28 recite the limitations "at least one structured metal layer" in lines 3-4 of each claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1, 3, 5, 7-9, 11, 21 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,054,762 Sakuraba et al.

Regarding claim 1, Sakuraba teaches a process for producing a metal-ceramic substrate comprising a ceramic layer **1** and a structured metal layer **3** with conductive tracks and contact surfaces on at least one surface side of the ceramic layer (column 1 lines 8-11 and column 2, lines 54-57) and at least one brazing resist coating applied to the structured metal layer (column 3, lines 4-5), the process comprising the following steps: a) applying at least one metal foil to at least one surface side of the ceramic layer by high temperature bonding at a bonding process temperature higher than 650°C for forming at least one metal layer on the ceramic layer (column 3, lines 20-27), b) structuring the at least one metal layer on at least one surface side of the

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ceramic layer for forming the structured metal layer with conductive tracks and contact surfaces (column 3, lines 28-31), c) applying the at least one brazing resist coating to the structured metal layer (column 3, lines 33-34), d) after applying the at least one brazing resist coating to the structured metal layer, removing some metal from the structured metal layer in surface areas bordering the brazing resist coating (column 3, lines 34-35) and e) leaving the brazing resist coating on the structured metal layer. The claim does not limit the steps to a particular order. Step e) is performed between steps c) and d) such that the brazing resist coating is left on while etching.

Sakuraba does not explicitly teach removing 0.1 to 20 microns in the removing step. However, one reading the reference as a whole would appreciate that Sakuraba is not concerned with exactly how the steps are formed. Instead of removing material in vertical columns as Sakuraba teaches, one could remove the material in horizontal rows and achieve the same result. The order in which the steps are formed is not critical to the invention. In such a method, first the height marked as t_3 would be removed over lengths l_1 and l_2 to the end of the substrate. Next, the height Marked as t_2 would be removed over the length l_1 to the end of the substrate. Finally, the height t_1 would be removed at the end of the substrate. This final removal step for t_1 would remove 20 microns (column 4, lines 15-18). It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the removal of vertical columns for the removal of horizontal rows because the same result is achieved regardless of how the steps are formed. In order to form the steps, the material must be removed one of those two ways, and it would be within the purview of one of ordinary skill in the art to choose one method or the other.

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Regarding claim 3, Sakuraba teaches that the high temperature bonding is a direct bonding process (column 3, lines 20-21) or an active brazing process (column 2, lines 61-64).

Regarding claim 5, Sakuraba teaches that the at least one brazing resist coating is applied before structuring (column 3, lines 28-29).

Regarding claim 7, Sakuraba teaches that the metal foils are copper foils and they are provided on the ceramic substrate by means of the DCB process (column 3, lines 20-22) or the active brazing process (column 2, lines 61-64).

Regarding claim 8, Sakuraba teaches that structuring of the at least one metal foil takes place by means of masking-etching process and wherein the at least one coating of brazing resist is applied immediately after this structuring (column 8 lines 28-31 and column 3, lines 31-33).

Regarding claim 9, Sakuraba teaches that structuring of the at least one metal foil takes place by means of a masking-etching process using an etching resist and wherein the at least one coating of brazing resist is applied immediately before application of the etching resist (column 3, lines 28-31), where the resist applied to form the steps are brazing resist and etching resists. Therefore, the resist applied to form the first step may be called the brazing resist, and the resist applied to form the next step may be called an etching resist.

Regarding claim 11, Sakuraba teaches that removal takes place by etching, using iron chloride (column 3, lines 28-31).

Regarding claim 21, Sakuraba does not explicitly teach that the at least one brazing resist coating has a thickness of 0.5 to 100 microns. However, it would have been within the purview of one of ordinary skill in the art to apply a brazing resist coating sufficient to protect the underlying material from the etchant without wasting brazing resist.

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Regarding claim 24, Sakuraba teaches most of the limitations above with respect to claim 1. Sakuraba additionally teaches b) structuring the metal coating on the at least one surface side of the ceramic layer by applying a mask of a photo resist to a surface side of the metal layer opposite to the ceramic layer and by subsequent edging away areas of the metal layer which are not covered by the mask of photo resist (column 4, lines 3-6), and c) removing the mask of photo resist (column 4, lines 7-8). Sakuraba does not use the term "brazing resist." However, in the instant specification, Applicant discloses that the resist is a "brazing resist" simply because it is prevented from migrating through the brazing layer because of the DCB process that took place immediately before (paragraph 0028). Thus, the DCB process followed by application of any resist would similarly prove the resist to be a brazing resist. Therefore, while Sakuraba does not use the phrase "brazing resist," the resist applied still meets the limitations of the claim.

Regarding claim 25, Sakuraba teaches some of the limitations above with respect to claim 21. Sakuraba further teaches that the brazing resist coating is applied to the structured metal layer such that it extends in a strip like manner along edges of the contact tracks and contact surfaces. Sakuraba does not show a picture of the brazing resist coating. However, if the resist coating is applied in order to etch the surface to form contact tracks and contact surfaces, the coating must be placed along the edges in a strip-like manner.

Regarding claim 26, Sakuraba teaches all of the limitations above with respect to claims 24 and 25.

Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,054,762 Sakuraba et al as applied to claim 1 above, and further in view of US 4,810,333 Gulla et al.

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Regarding claim 13, Sakuraba teaches producing a metal-ceramic substrate by applying a brazing resist coating, but does not teach cleaning first. Gulla teaches a method of producing a printed circuit board where a deposited copper layer is cleaned by removing a surface area of the metal coating (column 9, lines 39-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the cleaning step of Gulla in the method of Sakuraba before the resist-applying step because ensuring a clean surface will not only allow the resist to stick better, but will prevent etching of unwanted areas.

Regarding claim 14, Sakuraba teaches producing a metal-ceramic substrate by applying a brazing resist coating, but does not teach the method of cleaning. Gulla teaches cleaning by chemical removal (column 9, lines 39-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the cleaning method of Gulla in the method of Sakuraba because chemical removal is an accepted technique for the removal of surface material from a layer.

Regarding claim 15, Sakuraba teaches producing a metal-ceramic substrate by applying a brazing resist coating, but does not teach the method of cleaning. Gulla teaches chemical removal by using a hydrogen peroxide solution (column 9, lines 39-50).). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the cleaning materials of Gulla in the method of Sakuraba because hydrogen peroxide is a common etchant and removes surface material well.

15. Claims 16, 17, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,054,762 Sakuraba et al as applied to claim 1 above, and further in view of US 3,429,029 Langdon et al.

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Regarding claims 16, 27 and 28, Sakuraba teaches producing a metal-ceramic substrate but does not teach applying a metal coating in the removed areas. Langdon teaches making a structured substrate where a surface metal coating is applied to at least one surface area of the at least one metal coating, which area is produced by removal (column 4, lines 8-15). Neither Sakuraba nor Langdon teaches applying the metal coating such that it adjoins the resist coating. However, where the metal is placed is based upon the desired final product. One of ordinary skill in the art would be capable of applying the metal coating wherever one wanted. Additionally, because the resist coating is being used as a mask, it only follows that the removed areas would be adjacent to the resist. It would have been obvious to include the coating of Langdon in the method of Sakuraba because structured substrates are created by applying layers in specific locations with the use of resist masks.

Regarding claim 17, Sakuraba teaches producing a metal-ceramic substrate but does not teach applying a metal coating in the removed areas. Langdon teaches that the surface metal coating is applied such that the surface which has been formed by this surface metal coating is lower than (column 4, lines 47-48 and figure 6), level with (column 4, lines 66-67 and figure 4), or projects over (column 5, lines 17-19 and figure 8) the surface of at least one brazing resist coating or of the untreated surface underneath the at least one resist coating. It would have been obvious to include the coating of Langdon in the method of Sakuraba because structured substrates are created by applying layers in specific locations with the use of resist masks.

16. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,054,762 Sakuraba et al as applied to claim 1 above, and further in view of Us 6,627,384 Kim et al.

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Regarding claim 20, Sakuraba teaches producing a metal-ceramic substrate but does not teach the resist composition. Kim teaches a method of using a resist for structuring a layer where an epoxide-based coating is used for the brazing resist coating and wherein the brazing resist coating cures thermally (column 6, lines 7-13). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the composition and curing method of Kim in the method of Sakuraba because the composition allows for uniformly sized patterns (abstract) and thermal curing is an inexpensive way to cure a resist.

17. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,054,762 Sakuraba et al as applied to claim 1 above, and further in view of US 5,676,855 Schulz-Harder.

Regarding claim 22, Sakuraba teaches producing a metal-ceramic substrate but does not teach forming optically readable code. Schulz-Harder teaches that the brazing resist coating is structured to form coding (column 4, lines 57-60). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the use of Schulz-Harder in the method of Sakuraba because code can carry information about the product in a simple and efficient manner (column 4, lines 59-64).

Response to Arguments

18. Applicant's arguments filed March 5, 2010, have been fully considered but they are not persuasive.

Applicant argues that it would not be obvious for a person skilled in the art to perform only one edging step so that 0.1 to 20 microns are removed because it would not lead to the improvement claimed by Sakuraba. However, the reason for performing a particular step is irrelevant to the invention and the rejection. The reason for performing a step has no bearing on

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the fact that the claimed step is taking place. Sakuraba's method reads on the step whether or not it is for the same purpose. Please note that only one edging step is not claimed. That is, the claim does not exclude other edging steps taking place; it only requires that at least one takes place.

Applicant argues that Sakuraba does not teach a brazing resist. However, as disclosed in Applicant's specification, page 7, the brazing resist is defined as a thermally cured epoxide-based resist. Furthermore, the brazing resist bonds securely to the copper and does not migrate through the brazing material, thus resisting brazing material. As Sakuraba's resist bonds securely to the copper, and resists brazing material (see embodiments including brazing material 2), Sakuraba's resist qualifies as a brazing resist. Additionally, as explained above in claim 23, Applicant discloses that the resist is a "brazing resist" simply because it is prevented from migrating through the brazing layer because of the DCB process that took place immediately before (paragraph 0028). Thus, the DCB process followed by application of any resist would similarly prove the resist to be a brazing resist. Therefore, while Sakuraba does not use the terminology "brazing resist," the resist applied still meets the limitations of the claim despite the difference of semantics.

Applicant argues that Sakuraba does not teach step d) as a cleaning step. However, the reason for performing a particular step is irrelevant to the invention and the rejection. The reason for performing a step has no bearing on the fact that the claimed step is taking place. Sakuraba's method reads on the step whether or not it is for the same purpose. Please note that etching is a cleaning process as it removes some of the surface material.

Applicant argues that the new claims teach brazing resist at the edges of contact tracks and surfaces. Sakuraba does not explicitly state that this is where the resist is placed. However,

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the resist is used to etch away certain areas and protect other areas. Resists must be placed at the edges between regions they are meant to protect and regions that will be etched.

Applicant admits that claims 27 and 28 are taught by Sakuraba in view of Langdon as applied to claim 16 above.

Applicant argues that Langdon and Sakuraba are not analogous. However, both references are achieving the same end of using a resist to remove a portion of a metal layer. It would be obvious to one of ordinary skill in the art to look to any other reference that is performing the same etching operation.

Conclusion

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEGHA MEHTA whose telephone number is (571)270-3598. The examiner can normally be reached on Monday to Friday 7:30 am to 5:00 pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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